Letters

Biodiversity

Leslie Roberts' article "Hard choices ahead on biodiversity" (Research News, 30 Sept., p. 1759) echoes a growing awareness among conservation biologists (*1, 2*) that, because of the high costs and biological risks of rescuing endangered species, an ecosystem approach is needed to save the totality of what we call "biological diversity." A practical strategy would identify a set of areas rich in regional diversity that, if collectively protected, would capture most extant species in self-maintaining landscapes (*2*). The urgency of the extinction crisis precludes a detailed global inventory of biological resources before taking conservation action.

We believe that biologically critical areas can be identified through a combined analysis of the known distribution of vegetation, vertebrates, and butterflies (groups whose distribution is best documented). Comparing these areas with current preserves will identify gaps in the protection system (*3*). While the importance of target areas must be field-verified, this approach is "expedient and qualified," not "quick and dirty." Rather than "endangered species bashing" (*1*), this presents a practical way to avoid the triage question (*4*). We humans have an ethical responsibility to assist the recovery of species we have driven to the brink of extinction. We endorse efforts to fulfill that responsibility—through continued research, data accumulation and transfer, and even selected ex situ conservation measures. But the solution to the "biodiversity crisis" lies in reversing the accelerating curve of species extinctions through in situ habitat protection. The key to preserving biodiversity is ecosystem and landscape protection, not crisis management of an increasing number of endangered species.

We have initiated pilot programs to identify high-diversity areas in Idaho (1987) and Oregon (1988). Given the urgency of the need for a national assessment of the distribution of biodiversity, the methodology now being developed in the Pacific Northwest holds the promise of direct transfer to the national and international level. For $20 million to $25 million, this approach could be completed nationwide by 1993. The Oregon project will add butterflies to the analysis, factoring the distribution of a group of invertebrates into an integrated conservation strategy for the first time. We advocate gap analysis as the first step in getting ahead of the extinction curve globally. Gap analysis using species richness and vegetation types would provide a data base for further research and for testing the adequacy of conservation strategies based only on cover types and remote sensing against those that include detailed knowledge of species distributions. This question is of some importance, given the lack of extensive biological surveys in many countries.

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Roberts provides a valuable overview of the debates among biologists regarding the "biodiversity crisis." While it is encouraging that there is a modest increase in recognition of the importance of this crisis at the National Science Foundation and in Congress, it is also disappointing that the scientific community and the larger society both tend to see this as only one among a number of important issues and crises, rather than as one of the three main threats to modern societies (the others being nuclear war and climate change).

One reason for this lies in the difficulty of conveying the fundamental importance of increasing losses of genetic and biological diversity to a society attuned to artifact. The best analogy that I have been able to come up with is to language. If one recognizes that the "alphabet and language" of nature is orders of magnitude greater and more complex, the loss of biodiversity is comparable to that of losing individual letters of the alphabet, *plus* the words that contain those letters. Just as such letter, word, and information losses would soon cripple thinking and communications, escalating losses of biodiversity threaten first the adaptiveness and resiliency of our agricultural systems, and ultimately all other life-supporting systems.

Thus, while this may well be, as Thomas Lovejoy indicates, "biology's moment in history," it is much more than that. It is also a point where industrial societies must reexamine their values, their practices, and their priorities in order to shift from those that result in the domination and destruction of nature to those that encourage sharing and the regeneration of living systems. Rather than forcing biologists to fight over whether they should pursue conservation or research, societal and governmental priorities need to shift to where we allocate funds for both, plus the work by social scientists and humanists that is needed to address associated societal issues and choices. We need a mapping not only of critical taxonomies of species, but of the various agricultural, industrial, and social processes that threaten them. Finally, we need to "map" the demand for tropical products in the industrial world insofar as it creates or compounds "on site" destructive pressures on biodiversity.

To make all this possible, the scientific community will have to devise ways to reallocate existing funds to these priority areas from other useful, but postponable projects (*1*). Equally, the larger society will have to redefine national security to include both climatic and biodiversity threats and reallocate funding accordingly (*2*).

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Greenhouse Initiative

Science has been following closely debates about greenhouse warming: how large will it be, how soon will it arrive (is it here already), and what will be its effects? Most discussions include statements that greenhouse warming is a global effect and will require global, that is, international, solutions. True. But international does not necessarily mean every country has to participate to obtain a significant beneficial effect. We have examples of a few countries taking the initiative to accomplish major positive international effects. The International Atomic Energy Agency safeguards system was made possible by an agreement among the major nuclear weapons states, the United States, Soviet Union, and the United

Kingdom, with the support of France. The nuclear Non-Proliferation Treaty (NPT) was sponsored by the United States, the U.S.S.R., and the United Kingdom. The Montreal Protocol on chloroflurocarbons was successfully negotiated when the major producing countries agreed on a schedule to reduce manufacture of these products.

Perhaps the same approach can be taken with regard to burning of fossil fuels, the major anthropogenic contributor to CO_2, which accounts for half of the predicted global warming. In 1987, the United States and the Soviet Union accounted for 61% of the world's consumption of natural gas and 41% of the consumption of oil. Adding in the People's Republic of China (PRC), these three countries accounted for 58% of the world coal use and also possessed 66% of the world's known coal reserves (*1*). Perhaps one of the early initiatives of the environmentally conscious Bush Administration could be to open negotiations with the U.S.S.R. and the PRC for a CCNPT, a Climate Change Non-Proliferation Treaty.

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1. *BP Stat. Rev. World Energy*, June 1988, pp. 8, 23, 24, and 27.

Mediocrity

I assume that following his editorial "The Golden Median" Daniel E. Koshland, Jr. (2 Dec., p. 1225), plans to resign as Editor and enter some field in which he is less talented. The Society of Mediocrity can hardly tolerate the perceptive and insightful ideas expressed in that editorial.

I must disagree with one point however. Even in the Society of Mediocrity, athletic performance will remain as the one acceptable field of excellence. As a school board president I observed that those who opposed our attempts to promote academic excellence on the grounds it was elitist still demanded full funding and support for the athletic teams.

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Mediocrity ought not be celebrated, Koshland writes, but then why provide us with an editorial that can scarcely be viewed as other than mediocre, especially when one considers its faulty logic?

I emphatically do not wish to entice any but the brightest undergraduates to my university. However, I have long since learned that Scholastic Aptitude Test (SAT) scores provide an unsatisfactory basis for separating the best and the worst, an opinion widely supported (*1*). Nor have I seen achievements by our better students increase or decrease according to whether high grades were generously or stingily awarded. The suggestion that Olympic medals are what inspire athletes displays a similar (mediocre) level of critical thought.

Let me not be misunderstood. I do not defend mediocrity. But, it is a mistake to assume that those of us who believe certain instruments are counter-productive—SATs, grades, and medals, inter alia—are thus less dedicated to excellence than is Koshland.

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Animals in Research: Educational Funds

At the 1988 annual meeting of the American Society of Zoologists (ASZ) in San Francisco, a significant resolution was passed by a large majority of the members who attended the business meeting on 29 December. They voted to establish a system for collecting voluntarily contributed funds to be used for educational purposes relating to the issues of the need to use animals in research and teaching. The funds will be used in various ways to inform the public, politicians, educators, and the membership of the ASZ themselves on these questions. We hope that other biomedical societies will follow the example of the ASZ and establish similar educational funds, because of the ever-increasing threat to the use of animals for these purposes.

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A Strengthened Court

I agree completely with Daniel E. Koshland, Jr.'s, editorial of 18 November (p. 993). Perhaps the most important point he makes is that the role of the court ought to be strengthened. Somehow, even if it is only subconscious, experts seem to feel obliged to strengthen the case of the party that has employed them, be it the prosecution or the defense. In many European countries, the experts are called by the court and have no obligation to either the prosecution or the defense. Of course, as Koshland says, "defense and prosecution would still have the freedom to call whatever witnesses they chose." It has long been felt by many observers of our national scene that the extreme emphasis on the adversarial approach tends to interfere with the finding of the truth.

Not knowing enough about our system of law, I do not know whether the traditional aloofness of the judges is prescribed by the law, or is only an old tradition. It is certainly highly inappropriate when it comes to strongly conflicting statements of so-called experts on psychiatric cases. This is really the gist of Koshland's recommendation, and it is this proposal that I applaud so vigorously.

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U.S.–Soviet Cooperation

In the article (News & Comment, 2 Dec., p. 1243), there is some confusion between the history of the new journal *Science and Global Security*, whose editorial board Roald Sagdeev and I co-chair, and the International Foundation. A prerequisite for creation of both was the new glasnost policy of the Gorbachev leadership, but it was the Foundation, *not* the journal, which received the precedent-setting authorization this past October to operate as an independent organization headquartered in Moscow with the ability to raise funds in the U.S.S.R. The journal will be headquartered at Princeton University. Some of the costs of its editorial office will be supported by grants from private U.S. foundations. The other costs associated with its publication in English will be borne by Gordon and Breach Science publishers, and the costs associated with its publication in Russian will be borne by Mir publishers with a small subsidy from the Soviet Peace Fund.

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Erratum: In Robert Pool's Research News article "Microscopic motor is a first step" (21 Oct., p. 379), Long-Sheng Fan and Yu-Chong Tai should have been credited with Richard Muller as builders of the first rotating micromotor.

Erratum: In the next-to-last paragraph of Mark Crawford's article "Weapons reactor restart set back" (News & Comment, 23 Dec., p. 1630), the half-life of tritium is incorrectly given as 5 years. The correct time is 12.3 years.